

REMARKS

This Amendment, submitted in response to the Office Action dated January 26, 2004, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

As preliminary matters, the Examiner has objected to the drawings and specification for containing informalities. In regards to the drawing, Applicant has attached here to an annotated marked-up sheet, as well as a replacement sheet of the drawing to correct a typographical error for the “plano-concave lens.”

Applicant has amended the specification as set out above. With regard to the antecedent bases for the types of laser outputs, Applicant would direct the Examiner’s attention to page 4, line 13 to page 5, line 7. Applicant would note that verbatim support is not required to comply with the formalities for antecedence.

With regard to the Examiner’s comment on the beam expander, Applicant would submit that the beam expander would include a splitter, if the splitter provided beam expansion.

Turning to the merits of the Office Action, claims 1-20 remain pending in the application. Claim 1 has been rejected under 35 U.S.C. § 102(b) as being anticipated by Fejer et al. (U.S.P. 4,650,322, hereafter “Fejer”). Claims 1, 9-10, 12 and 19 have been rejected under 35 U.S.C. § 103 as being unpatentable over Kruishoop (U.S.P. 4,849,640) in view of Osborne (U.S.P. 4,069,080). Claim 2 has been rejected under 35 U.S.C. § 103 as being unpatentable over Kruishoop in view of Osborne and further in view of Ortiz (U.S.P. 4,958,900) or Kato (U.S.P. 4,566,762). Claim 3 has been rejected under 35 U.S.C. § 103 as being unpatentable over

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Kruishoop in view of Osborne and further in view of Petisce (U.S.P. 5,015,068, hereafter “Petisce ‘068”) in view of Yamada (U.S.P. 6,033,829). Claims 4 and 14 have been rejected under 35 U.S.C. § 103 as being unpatentable over Kruishoop in view of Osborne and further in view of Petisce ‘068 and Yamada and Tausch (U.S.P. 6,078,713). Claims 5 and 15 have been rejected under 35 U.S.C. § 103 as being unpatentable over Kruishoop in view of Osborne, Petisce ‘068, Yamada and further in view of Akerman (EP 0 202 803 A2). Claims 6 and 13 have been rejected under 35 U.S.C. § 103 as being unpatentable over Kruishoop in view of Osborne and further in view of Petisce (U.S.P. 5,000,772, hereafter “Petisce ‘772”). Claims 7, 11 and 18 have been rejected under 35 U.S.C. § 103 as being unpatentable over Kruishoop in view of Osborne and further in view of Akerman. Claim 8 has been rejected under 35 U.S.C. § 103 as being unpatentable over Kruishoop in view of Osborne, Petisce ‘772, Tausch and Field (U.S.P. 6,195,486). Claim 16 has been rejected under 35 U.S.C. § 103 as being unpatentable over Kruishoop in view of Osborne and further in view of Field. Claims 17 and 20 have been rejected under 35 U.S.C. § 103 as being unpatentable over Kruishoop in view of Osborne and further in view of Petisce ‘068, Yamada and Field. Applicant submits the following arguments in traversal of the prior art rejections.

The present invention relates to a method and apparatus for photocuring a coating on a fiber. The apparatus includes a light source with certain optical elements to impart a linear form of light onto a target fiber for curing a coating on the fiber. Additional optical elements can be disposed to further enhance the optical effect of the light source, and a magnetic field can also be applied to enhance the cure rate. The source of light may be flexibly chosen from a continuous or pulsed source and may span several wavelength ranges.

Turning to the cited art, Fejer relates to device to measure the changes in diameter of a fiber. Light incident to a measured fiber becomes diffracted by the fiber. A photodetector detects the diffraction, which is used by a processor to determine changes in fiber diameter.

Kruishoop relates to curing of a coating on a fiber using a specific arrangement of mirror devices. Referring to Fig. 2 of Kruishoop, an optical system including multiple mirrors S1-S6 images a light source L onto a fiber disposed on an optical axis O'1, O1. Elliptical mirror S1 receives 85% of the light produced by the lamp, and is followed by two plane mirrors S2, S3 which are arranged perpendicular to each other. This arrangement of plane mirrors ensures that the optical axis OO' and radiation path of the beam are rotated 180 degrees to maintain separation between the lamp and the wire. In this manner, the radiation path can be folded, thereby providing a more compact curing structure, which is one object of Kruishoop. Col. 3, line 53 to col. 4, line 18; col. 2, lines 14-21; col. 1, lines 54-56. Kruishoop favors the mirror arrangement in comparison to lenses due to the ability of mirrors to provide a folded path and less radiation absorption. Col. 2, lines 17-21.

Osborne relates to a method and apparatus to provide a linear weld to polymeric materials. In particular, a laser source is provided to raise the temperature of a material to a welding or fusing temperature to create useful products. Col. 1, lines 15-23. Clamping of materials to form the weld is provided by a pneumatic jet. Col. 4, lines 20-23.

Kato relates to a dual focus lens system to focus two objects, separate from each other on an optical axis, on a common imaging plane. Abstract. Referring to Fig. 2A, for example, images of a first object S1 and second object s2 spaced from each other by Δ are formed on the

same image plane S' at an equal magnification by objective lens Lo. The system includes converging and diverging elements A1 and A2 to provide the dual focus aspects of the invention. An analogous arrangement is shown in Fig. 4A, including respective converging element A21 and diverging element A11.

The remaining references generally relate to curing of coatings on fibers.

With regard to the anticipation rejection over Fejer, the Examiner contends that Fejer teaches each aspect of claim 1. Applicant submits that the rejection is not supported for at least the following three reasons.

First, the Examiner contends that the spherical doublet 28 of Fejer corresponds to a concave optical element. Applicant argues that the Examiner's characterization of the spherical doublet is incorrect. At a minimum, at least the external surface disposed away from the fiber comprises a convex surface, which is apparent to anyone skilled in the art. To the extent that the element is described as a "doublet", this would suggest that the surface disposed near the fiber is also convex, although perhaps not to the same degree. An examination of the figures 2A-2B of Fejer would further suggest that if the lens 28 is not dual convex, then it is plano-convex. Applicant would submit that the light convergence pattern of the lens is consistent with a plano-convex form. To the extent that the Examiner is relying upon an internally illustrated aspect of the lens, Applicant would submit that the description of the lens is sufficiently ambiguous on this point that the lens cannot be described as a concave lens element with any degree of certainty. No matter how the element is characterized, the ambiguities regarding the convex nature of the lens element does not support the anticipation rejection. More particularly, it is well-settled that

probabilities do not support prior art rejections. Therefore, the anticipation rejection should be withdrawn for at least this reason.

Second, the Examiner concedes that Fejer relates to a measurement device rather than a curing device as claimed. However, the Examiner contends that the description of the curing features of the claim are merely field of use restrictions. Applicant would submit that field of use is only applicable to situations where the prior art teaches each and every feature of the claim. In this case, the Examiner has not provided such a reference for the reasons set forth above.

Third, to the extent that the Examiner contends that the examination light also cures the material, Applicant would submit that this is an incorrect assumption. Fejer relates to obtaining a physical measurement for a fiber diameter during formation. To contend that the measurement procedure would also be able to adjust a physical characteristic, such as by curing, would be contradictory to the device's ability to measure the fiber diameter with any consistency. Therefore, the Examiner's contention is without basis.

For all the foregoing reasons, Applicant would submit that claim 1 is not anticipated by Fejer.

With regard to the rejection of independent claim 1 over the combination of Kruishoop and Osborne, the Examiner correctly concedes that Kruishoop does not teach the optical arrangement of elements as described by claim 1 and cites Osborne to make up for these deficiencies. Applicant would submit that the rejection is not supported for at least the following five reasons.

First, as an initial matter, Osborne is drawn from non-analogous art. In order to qualify as prior art, references must be drawn from Applicant's field of endeavor or be reasonably pertinent to the problem addressed by Applicant. Osborne is drawn from the art of manufacturing of articles from plastics. By contrast, Applicant's field of endeavor is the manufacture of optical fibers. Further, Osborne is directed to a method of welding a polymer material by raising a material to its fusing temperature. By contrast, Applicant's invention relates to a curing process. In the present application, raising the material temperature to a welding or fusing temperature is irrelevant and contradictory to the features of the invention. Therefore, Osborne does not qualify as invalidating art.

Second, assuming *arguendo* that Osborne comprises properly applied art, Kruishoop and Osborne teach away from their combination with each other. In particular, Kruishoop specifically contemplates the use of mirrors rather than lenses in order to 1) provide a radiation path length that can be folded; 2) to provide a compact device, and 3) to provide greater efficiencies in heat direction. If Kruishoop were to replace the mirror elements with lens elements, there would be significant dissipation of light through the light-transmissive lenses, the directivity of the light could not be controlled as well, and therefore the radiation path length of the light could not be folded. This, in turn, would lead to a linear arrangement that would defeat the objects of providing a compact apparatus as described by Kruishoop. See Kruishoop, Col. 3, line 53 to col. 4, line 18; col. 2, lines 14-21; col. 1, lines 54-56; Col. 2, lines 17-21.

Third, and relatedly, the Examiner contends that it would be obvious to combine Kruishoop and Osborne due to 1) a reasonable expectation of success and 2) simplicity in arrangement of optical devices. However, in view of the objects of Kruishoop as stated above,

the use of the lens elements would not provide a reasonable expectation of success, but would in fact provide much poorer results. There can be no motivation to combine in this situation. With regard to the purported simplicity afforded by Osborne, it is noted that the linear arrangement precludes the folded arrangement favored by Kruishoop. Taking into account the fair teachings of the references, one skilled in the art would not be motivated to combine Kruishoop and Osborne, except through improper hindsight.

Fourth, even assuming *arguendo* that the references may be combined, their combination does not teach each feature of the claims. The Examiner concedes that the arrangement of the optical elements is not taught by Kruishoop. However, the Examiner must rely on Kruishoop to teach a concave element disposed on a side of the optical fiber relative to the beam expander and first lens. This is because there is no such concave element in Osborne. However, even if one were to combine Kruishoop and Osborne, there is no apparent rationale why the concave element position would be on an opposite side of a target relative to a beam expander and first lens. In Osborne, the back-diffusion of light caused by placement of such a concave element would likely lead to fusing in areas other than a linear area for forming a seam. In Kruishoop, the concave element would not be placed on sides opposite the fiber relative to the beam expander and lens, since this would apparently place the optical elements in the travel path of the fiber, between aperture H1 and H2. The claimed arrangement cannot be achieved, except through a significant re-design of the Kruishoop reference in a manner not taught or suggested by the art.

Fifth, the Examiner contends that the concave element is disposed on the opposite side of the fiber relative to the light source. Detailed Action, page 6, lines 5-7. However, the claim

describes the positioning relative to the beam expander and lens. Therefore, claim 1 is patentable for at least these reasons.

Because claim 12 includes recitations analogous to claim 1, claim 12 is patentable for all the reasons set forth above for claim 1. Claims 2-11 and 13-20 are patentable based on their dependency.

With further regard to claim 2, this claim describes a plano-concave lens disposed in a particular orientation relative to the beam expander. The Examiner cites Kato or Ortiz to teach this aspect of the invention. With regard to Ortiz, the Examiner cites element 42 of Fig. 1. However, the cited lens element is a plano-convex lens, not a plano-concave lens. Further, no concave lens is disposed with a planar side towards a beam expander as claimed.

With regard to Ortiz, Applicant would note that Ortiz is drawn from non-analogous art. Ortiz is drawn to a field of microscopy, not fiber formation. The object of Ortiz relates to a dual focus of features located at two distances on an optical axis. By contrast, the present invention relates to photo curing of a fiber coating. Further, even assuming that Ortiz may be properly applied against the claims, the objects S1 and S2 of Ortiz are disposed on the right hand side of the Fig. 4A. Therefore, the orientation of any plano-concave lens is not oriented correctly with regard to the claim, and further is not disposed correctly relative to a beam expander as claimed. Therefore, claim 2 is patentable for these additional reasons.

With further regard to claims 7, 11 and 18, these claims describe a distance for the light source relative to the fiber as being 2m or more. The Examiner generally relies on Ackerman to teach this feature. While Ackerman describes that the propagation distance of light may be long,

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the reference does not specify the particular dimension as claimed. Moreover, Applicant would submit that the primary reference, Kruishoop generally seeks to make the apparatus compact, which would appear to be contrary to providing the longer displacement as claimed. Further, Applicant would submit that one skilled in the art, based on Kruishoop would not provide a longer distance due to light dispersion over a greater separation between the light source and target. Therefore, claims 7, 11 and 18 are patentable for these additional reasons.

Applicant would further note that none of the additional references Field, Petisce '068, Petisce '772, Tausch, Akerman, and Yamada make up for the deficiencies of the primary combinations of Osborne and Kruishoop.

In view of the above, Applicant submits that claims 1-20 are in condition for allowance. Therefore it is respectfully requested that the subject application be passed to issue at the earliest possible time. The Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

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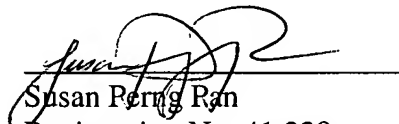
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